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SURFACE PROTECTIVE FILM

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[Attached amendments have been incorporated into the text of translation.]

Abstract

Constitution

A 2-layer surface protective film for a chemically colored stainless steel sheet characterized by the fact that the surface layer is a polyolefin with a thickness of 40-120 μm , and the adhesive layer has a thickness of 10-30 μm and consists of (1) an ethylene-vinyl acetate copolymer (vinyl acetate content of 5-25%) or (2) 100 parts by weight of such an ethylene-vinyl acetate copolymer or a polyethylene and 5-20 parts by weight of a petroleum hydrocarbon resin.

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Effects

This surface protective film is good in both adhesive strength and peel-off characteristics. Since no adhesive remains after peeling off, no discoloration of the colored stainless steel sheet is observed.

Claims

1. A surface protective film consisting of a surface protective layer made of a polyolefin and an adhesive layer made of the following Component (A) or Component (B).

(1) An ethylene-vinyl acetate copolymer with a vinyl acetate content of 5-25 wt% (Component A).

(2) A composition consisting of 100 parts by weight of the ethylene-vinyl acetate copolymer described in (1) or polyethylene and 5-20 parts by weight of a petroleum hydrocarbon resin (Component B).

2. The surface protective film described in Claim 1 in which the thickness of the surface protective layer is 40-120 μm , and the thickness of the adhesive layer is 10-30 μm .

3. A colored stainless steel sheet obtained by providing a surface protective film described in Claim 1 or 2 on the surface of a chemically colored stainless steel sheet.

Detailed explanation of the invention

[0001]

Industrial application field

The present invention relates to a surface protective film used for the surface protection of, in particular, a chemically colored stainless steel sheet, and to a colored stainless steel sheet provided with said protective film.

[0002]

Prior art

Chemically colored stainless steel material is often used in material of construction, household products, decorative products and so on. In general, it is obtained by a manufacturing method called the Inco [Transliterated] method. It is immersed in, for example, a concentrated mixed aqueous solution of anhydrous chromic acid and sulfuric acid. A potential is applied to carry out appropriate coloration. Furthermore, an appropriate thick film treatment is carried out. The reason for carrying out the thick film treatment is that, when this treatment is not applied, there are numerous pores on the colored coated film obtained. Since it is porous, wear resistance is poor.

[0003]

The principle of its color formation is due to the interference of light by the oxide film although the oxide film itself is colorless.

[0004]

Owing to the surface protection of such a colored stainless steel material, discoloration from green color to light brown color may occur when bonding a conventional tacky film. Furthermore, the same phenomenon can be observed by rendering a fingerprint. These are believed to be discolorations due to the fact that organic components of the fingerprint adhere and a delicate change in the thickness of light interference and refractive index is observed.

[0005]

From this fact, in order to prevent discoloration, it is necessary that the tacky components do not remain on the adhered material as much as possible during peeling off from the colored stainless steel material after bonding. Furthermore, in order to minimize the effect on the oxide film, it is preferable that there are no polar groups in the adhesive components.

[0006]

Conventionally, as protective films of the colored stainless steel material, a polyvinyl chloride tacky tape or a polyolefin tacky tape has been used. In general, this polyvinyl chloride material is a material obtained by coating an acrylic tacky producer or a rubber tacky producer on a white film containing a large amount of TiO_2 or CaCO_3 . Its thickness is 60-120 μm for the polyvinyl chloride film and 5-15 μm for the tacky layer.

[0007]

The colored stainless steel sheet has different surface roughness, depending on the type and the application. It may be necessary to adhere on a rough material to a certain extent. However, by considering the thickness of this tacky [layer] and in order to achieve adhesion even on a rough sheet, relatively soft tacky producers can be used. However, for these soft adhesives during peeling off, tacky producers remain on the colored stainless steel material. Therefore, discoloration easily occurs. Furthermore, in order to achieve a state in which the tacky producer does not remain to an extent that cannot be observed visually, the adhesive is crosslinked. In general, in the case of acrylic acid ester type, they are copolymers having $-\text{COOH}$ groups or $-\text{OH}$ groups. Furthermore, since an epoxy group, an amine, an isocyanate or the like is used as a crosslinking agent, there is a disadvantage in which freed polar groups may easily remain.

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[0008]

Problems to be solved by the invention

The present invention has a task to provide a surface protective film for a colored stainless steel material, that has an appropriate adhesive strength, is easy to peel off, is difficult for the adhesive to remain after peeling off, and is difficult for the occurrence of discoloration observed conventionally, and a colored stainless steel sheet provided with such a surface protective film.

[0009]

Means to solve the problems

The present invention has been accomplished as a result of a variety of investigations in order to solve the problems described previously. It is a surface protective film consisting of a surface protective layer made of a polyolefin and an adhesive layer made of the following Component (A) or Component (B), and a colored stainless steel sheet with the thermal adhesion of such a surface protective film.

(1) An ethylene-vinyl acetate copolymer with a vinyl acetate content of 5-25 wt% (Component A)

(2) A composition consisting of 100 parts by weight of the ethylene-vinyl acetate copolymer described in (1) or polyethylene and 5-20 parts by weight of a petroleum hydrocarbon resin (Component B).

[0010]

The surface protective film of the present invention consists of the surface protective layer and the adhesive layer described previously. In general, it is constituted by these two layers. The adhesive layer is a layer adhered to the body (such as a colored stainless steel sheet). The surface protective layer is a layer for the protection of the body to be adhered. In addition to the previously mentioned two layers on the surface protective film of the present invention, a layer for preventing deterioration due to light may also be further provided. The surface protective layer for use in the present invention is made of polyolefin. It is in a film form with a thickness of generally 40-120 μm , preferably 60-110 μm , especially preferably 80-100 μm . If its thickness is less than 40 μm , the surface protective layer is easily broken by an external force and there is a trend in which a scratch is rendered on the body adhered. Furthermore, if its thickness is more than 120 μm , the film is hard, it is difficult for the surface to become attached to the uneven body surface, and there is a trend in which it easily comes off.

[0011]

As the polyolefins, homopolymers or copolymers of α -olefins, such as ethylene, propylene, butene-1, 4-methyl pentene-1, and so on, homopolymers or copolymers of α -olefins containing a halogen, carboxylic acids or their derivatives, and their blended products can be exemplified. Furthermore, vinyl acetate may also be blended at less than 10 wt%, preferably less than 5 wt%. The melt index (MI) of the polyolefin is generally less than 15, preferably 3-8.

[0012]

There are no special restrictions on the adhesive layer as long as it is a material made of Component A or B mentioned previously. For example, in controlling the force required during peeling off, generally speaking, at 5 m/min, it is preferable that the peeling-off force for a 1 m width is less than 20 kg (400 g/20 cm) and more than 2 kg (40 g/20 cm). This is probably due to the fact that, when more than 20 kg, continuous peeling-off will be difficult. If it is less than 2 kg, peeling-off is often observed during standing.

[0013]

The content of vinyl acetate in Component A constituting the adhesive layer is 5-25 wt%, preferably 5-20 wt%, even more preferably 10-15 wt%. If the content of vinyl acetate is less than 5 wt%, a high temperature will be required to achieve adhesion during thermal fusion. As a result, there is a tendency in which the polyolefin surface protective layer will deform. If it is more than 25 wt%, there is a tendency in which phenomena of difficult peeling-off, breaking during temporal storage, and so on will occur. The MI of the ethylene-vinyl acetate copolymer is generally 1-30, preferably 5-20. It is preferable that the polyethylene in Component B constituting the adhesive layer is low-density polyethylene. If it is high-density polyethylene, miscibility with the blended material will be poor, the color will become muddy white, and the discoloration of the color will be observed. Furthermore, a copolymer having a polarity is especially undesirable. A material with a high MI even at a low density is preferred.

[0014]

The petroleum hydrocarbon resin in Component B constituting the adhesive layer is a material preferably with a Vicat softening point of more than 60°C, even more preferably 70-120°C. Specifically, they are copolymers of a variety of aromatic, aliphatic unsaturated hydrocarbons, or their hydrogenated substances. More specifically, C₅ type, C₉ type, DCPD and other materials commonly used as tackiness rendering agent resins for tacky tapes can be used.

[0015]

The amount of blending of the petroleum hydrocarbon resin is 5-20 parts by weight, preferably 10-15 parts by weight, with respect to 100 parts by weight of the ethylene-vinyl acetate copolymer mentioned previously. If it is less than 5 parts, adhesion will be insufficient and falling off will be easy in the initial period and temporal storage. If it is more than 20 parts, adhesion will be strong. In particular, the adhesive strength will increase excessively with temporal storage and there will be cases in which peeling-off will be difficult and breaking may occur.

[0016]

The surface protective film of the present invention can be applied generally to a body to be adhered by thermal fusion, appropriately to the surface of a colored stainless steel sheet by thermal fusion. The thermal fusion is generally carried out in the following manner. In other words, bonding is carried out at a speed of 5 m/min under a linear pressure of 10 kg/cm² between a rubber roll and an iron roll heated to 70-110°C. The thermal fusion conditions vary with the thickness of the sheet and the atmosphere temperature. If it is above 110°C, the deformation of the polyolefin film will be severe. If it is less than 70°C, there is no effectiveness. As the linear pressure and the speed, their appropriate conditions can be selected each time.

[0017]

Application examples

Specific examples are shown by application examples in the following.

Application Example 1

A 2-layer film consisting of a polyethylene film (MI 2, manufactured by Mitsui Petrochemical Co., Ltd.) of 60 μm as a surface layer and an ethylene-vinyl acetate copolymer film (vinyl acetate content 14%, and MI 15) of 10 μm as an adhesive layer

[0018]

Application Example 2

A 2-layer film consisting of a polyethylene film (NUC-8150, M1-2, 4, manufactured by Nippon Unicar Co., Ltd.) of 100 μm as a surface layer, and a blend of 100 parts of the polyethylene (NUC-8150, M1-2, 4, manufactured by Nippon Unicar Co., Ltd.) and 10 parts of a hydrogenated material (Alcon [transliterated] 90, softening point 90°C) of a petroleum alicyclic hydrocarbon of 20 μm as an adhesive layer

[0019]

Application Example 3

A 2-layer film consisting of a blend of 20 parts polyethylene (M1-4, 5, manufactured by Mitsui Petrochemical Co., Ltd.) and 80 parts polypropylene (M1-6, manufactured by Mitsui Petrochemical Co., Ltd.) of 40 μm as a surface layer, and a blend of 100 parts of an ethylene-vinyl acetate copolymer film (vinyl acetate content 6%, and M1-25) and 10 parts of a petroleum hydrocarbon (product name Queenton [transliterated] D-100) of 10 μm as an adhesive layer.

Quintone

[0020]

Comparative examples

Comparative Example 1

Polyester tacky tape (No. 31-B, manufactured by Nitto Denko Co., Ltd.) 50 μm .

Comparative Example 2

A material obtained by coating 10 μm of an acrylic tacky producer (SPV-3633, manufactured by Nitto Denko Co., Ltd.) on a polyethylene film (60 μm).

[0021]

The films of the application examples and the comparative examples described previously were adhered on the surface of chemically colored stainless steel BA-304 (green). The adhesion was carried out with a press at 100°C and 10 kg/cm² for 5 sec in the application examples. In the comparative examples, the same treatment was carried out at ambient temperature. As a result, their peeling forces and degrees of discoloration are shown in the following. In the evaluations of the adhesive strength and discoloration, states are shown after three days at (A) ambient temperature, (B) 40°C x 92%, and (C) 50°C.

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[0022]

Table 1

		實 施 例 ①			比 較 例 ②	
		1	2	3	1	2
③ 剝離力 (g/20cm)	A	40	140	220	850	70
	B	60	180	290	1100	140
	C	80	200	280	1120	130
④ 変 色	A	○	○	○	△	△
	B	○	○	○	×	×
	C	○	○	○	△	△

○ No discoloration observed

△ Slightly discolored

× Clearly discolored

Key: 1 Application Example
 2 Comparative Example
 3 Peeling force
 4 Discoloration

[0023]

Effects of the invention

As explained previously, the surface protective film for the chemically colored stainless steel sheet of the present invention is good in both adhesive strength and peel-off characteristics. Since no adhesive remains after peeling off, the discoloration of a colored stainless steel sheet can be effectively prevented.